IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	**10/604,630**
Application of:	**Danner et al.**
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Cambridge, Massachusetts
July 24, 2008

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Sir:

This is an appeal from the final rejection of all claims of the above application as set forth in the Office Action mailed October 25, 2007.

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REAL PARTY IN INTEREST

The real party in interest in this appeal is E Ink Corporation, the assignee of record, a corporation organized and existing under the laws of the State of Delaware, of 733 Concord Avenue, Cambridge, MA 02138-1002.

RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences.

STATUS OF CLAIMS

Claims 2, 3, 5, 6, 11 and 22-25 are pending in this application. All claims stand finally rejected. No claim is subject to a restriction or election requirement. All claims are appealed. A copy of the claims on appeal appears in the Appendix to this Brief. This copy of the claims assumes entry of the Amendment after Appeal filed July 21, 2008; see the next page.

STATUS OF AMENDMENTS

The Amendments filed during prior to issue of the final Office Action have been entered. On July 21, 2008, the undersigned attorney filed an Amendment After Appeal making minor changes in claims 2, 3, 5 and 6 was filed after the final Office Action. The Examiner has not so far decided as to entry of this Amendment. The version of the claims in the Appendix assumes entry of this Amendment.

SUMMARY OF CLAIMED SUBJECT MATTER

Claim 11 (see especially Paragraphs 37-42 of the specification) is directed to an electro-optic display (100 in Figure 1) comprising a layer of reflective electro-optic material (102 – see also Paragraph 39) capable of changing its optical state on application of an electric field thereto, an electrode (see Paragraph 39, second sentence) arranged to apply an electric field to the layer of electro-optic medium (102), and a heat generating component (112 –see Paragraph 39, last sentence). The heat generating component (112) is in heat conducting relationship with the layer of electro-optic material (102) (i.e., heat is able to flow from the heat generating component to the electro-optic layer). Also, the heat generating component (112) is disposed on the opposed side of the electrode from the layer of electro-optic material (102); in Figure 1, the electro-optic layer (102) is sandwiched between two sets of electrodes, as stated at Paragraph 39, second sentence, so that one electrode lies between the electro-optic layer (102) and the printed circuit boards (104) so that the heat generating components (112) must be disposed on the opposed side of this electrode from the layer of electro-optic material (102). A layer of thermally conducting material (the ground planes 108 of the printed circuit boards 104 in Figure 1 – see also, Paragraph 39, third sentence) is disposed between the heat generating component (112) and the aforementioned electrode, and an air gap (110 – see Paragraph 39, fourth sentence) is present between the electrode and the layer (108) of thermally conducting material. The layer (108) of thermally conducting material and the air gap (110) extend across the whole are of the layer of electro-optic material (102) – see Figure 1 and Paragraph 41 of the specification. The provision of the layer (108) of thermally conducting material and the air gap (110) produce a much more homogeneous temperature distribution with the display (100) and consequently a much more uniform image (see Paragraph 37, last sentence).

Claim 2 is directed to a display according to claim 11 in which the layer (108) of thermally conducting material forms part of a printed circuit board (104) having

a conductive layer (108) therein. See Figure 1 and Paragraph 39 of the specification, as discussed above.

Claim 3 is directed to a display according to claim 11 in which the layer (108) of thermally conducting material forms part of a plurality of layers (106) of thermally insulating material and a plurality of layers (108) of thermally conducting material, the layers of thermally insulating material (106) alternating with the layers of thermally conducting material (108), and one layer of thermally conducting material (the topmost layer 108 in Figure 1)being disposed between the layers (106) of thermally insulating material and the layer (102) of electro-optic material. The structure as shown in Figure 1 and described in Paragraph 39 obviously meets all the limitations of this claim.

Claim 5 is directed to a display according to claim 11 in which the layer of thermally conducting material forms part of a polymeric film having a metal layer formed thereon, while claim 6 is directed to a display according to claim 5 in which the layer of thermally conducting material forms part of an aluminized film. Both these claims are based upon Paragraph 42 of the specification, which discusses the use of the relevant metalized films.

Claim 22 is directed to a display according to claim 11 in which the electro-optic material comprises a rotating bichromal member material or an electrochromic material. Paragraph 43, first sentence states that the electro-optic displays of the invention may make use of any of the types of electro-optic material previously discussed. Rotating bichromal member materials are discussed in Paragraph 4, and electrochromic materials in Paragraph 5 of the specification.

Similarly, claim 23 is directed to a display according to claim 11 in which the electro-optic material comprises an electrophoretic material. Electrophoretic materials are discussed in detail in Paragraphs 6-10.

Claim 24 is directed to a display according to claim 23 in which the electrophoretic material comprises at least one capsule having a capsule wall encapsulating a suspending fluid and a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the electrophoretic material. Such encapsulated electrophoretic media are described in Paragraphs 6 and 7.

Finally, claim 25 is directed to a display according to claim 23 in which the electrophoretic material comprises a substrate having a plurality of closed cells formed therein, each of the cells having therein a suspending fluid and a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the electrophoretic material. This type of "polymer-dispersed" electrophoretic display is described in Paragraph 8 of the specification.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

All claims stand rejected under 35 USC 103(a) as unpatentable over Duthaler et al., U.S. Patent No. 6,312,304 (hereinafter "Duthaler") in view of Leibowitz et al., U.S. Patent No. 4,689,110 (hereinafter "Leibowitz") and further in view of Sato et al., U.S. Patent No. 5,869,919 (hereinafter "Sato").

Paragraph 8 of the final Office Action also objects to claims 2-3 and 5-6 as lacking antecedent basis for the term "heat shield". It is believed that this objection is moot in view of the aforementioned Amendment After Appeal.

ARGUMENT

Summary

None of the claims on appeal are unpatentable over Duthaler, Leibowitz and Sato because there is no logical way of combining these three references.

Detailed argument

Applicants do not dispute the description of Duthaler appearing on pages 4-5 of the final Office Action, namely that Duthaler discloses an electro-optic display comprising a layer of reflective electro-optic material capable of changing its optical state on application of an electric field thereto, an electrode arranged to apply an electric field to the layer of electro-optic material, a heat generating component in heat conducting relationship with the layer of electro-optic material, the heat generating component being disposed on the opposed side of the electrode from the layer of electro-optic material, and a printed circuit board placed between the heat generating component and the electrode, the printed circuit board extending across the whole area of the layer of electro-optic material.

Furthermore, applicants do not dispute that, as stated in the final Office Action, Leibowitz discloses a printed circuit board capable of functioning as a heat shield with layers of thermally conducting material, wherein the thermally conducting materials extend across the entire board. Finally, for purposes of the present argument, applicants will accept the contention in the final Office Action that it would have been obvious to one of ordinary skill in the art to replace the circuit board of Duthaler with the multi-layered circuit board of Leibowitz.

As acknowledged in the last paragraph on page 5 of the final Office Action, neither Leibowitz nor Duthaler discloses an air gap present between the circuit board and the electrode of the display. The final Office Action states that it would be obvious to incorporate such an air gap because Sato discloses a display device having an air gap between a circuit board and the electrodes of a display. Furthermore, the final

Office Action states, Leibowitz, Duthaler and Sato are all analogous art because they are all from the same problem area, namely circuit board manufacturing and packaging. Accordingly, the final Office Action concludes, it would have been obvious to one of ordinary skill in the art to include an air gap between the circuit board of Leibowitz and the display electrodes of Duthaler, and the motivation for doing so would been to effectively cool the display as well as the drive circuits.

Applicants take issue with the contention that it is obvious to combine Sato with the other references in this manner. Duthaler and the present claims require a reflective electro-optic material capable of changing its optical state on application of an electric field thereto, an electrode arranged to apply an electric field to the layer of electro-optic material, and a heat generating component in heat conducting relationship with the layer of electro-optic material. As discussed in detail in Paragraphs 11 to 18 of this application, reflective electro-optic media such as those used in the Duthaler display suffer imaging problems when subject to heat flow from heat generating components used in the drive circuitry of the displays. Furthermore, the reflective electro-optic media themselves have low power consumption even compared to liquid crystal displays (see Paragraph 6 of this application), and hence there is negligible heat generation within the electro-optic medium during operation of an electro-optic display such as that shown in Duthaler.

Sato describes a plasma display panel, such as those used in so-called "plasma television sets". As the Board is no doubt aware, such plasma display panels are well known to have high power consumption and, as discussed at column 2, lines 46-59 of Sato, substantial amounts of heat are generated in such plasma display panels when the electrons strike the phosphor on the viewing surface of the panel. The resulting heating of the panel itself can lead to differential thermal expansion resulting in a distorted display screen, color break up and other problems. Accordingly, to prevent these problems, Sato

proposes providing the display with an air blower for causing air to flow between the display panel and a housing which surrounds the panel.

The particular embodiment of Figure 8, which is apparently intended to cope with a display which generates very large amounts of heat, provides a film 825 of silver on the rear (non-viewing) surface of the display and fins 827 of silver protruding from the film 825. Apparently to allow maximum airflow over the film 825 and fins 827, the drive circuits 820 for the display are placed on a separate board which is spaced from the film 825 and fins 827. A fan 817 is arranged to blow air at a rate of 5 cubic meters per minute (!) over the fins 827 and along both major surfaces of the drive circuits.

Even if a skilled person were to conceive of replacing the printed circuit board of Duthaler with the Leibowitz printed circuit board/heat shield, there is no reason why the skilled person would consider it necessary or even desirable to provide an air gap between the electro-optic medium and the printed circuit board. Given the difference in power consumption between the electrophoretic display of Duthaler and the plasma display of Sato, a person skilled in electro-optic displays would not consider Sato relevant to the problem of heat dissipation in the Duthaler display. In Sato, substantially all of the heat generation occurs within the display itself as the high voltage electrons strike the phosphor, and the problem is simply to remove the large amounts of heat generated from the display in order to color break up and other undesirable effects of even temperature. The function of the "air gap" in Sato's Figure 8 is simply to provide more rapid and efficient heat removal from the display by avoiding the need for the heat to flow through the drive circuits before reaching the cooling air; note that the displays in Sato's Figures 1 to 7 do not have an air gap, and the heat generated within the display must flow through the drive circuits before it can be removed by the cooling air flowing around the display.

The function of the air gap in the present display is completely different. The air gap does not assist in removing heat generated within the display but assists in

retarding the flow of heat generated by the drive circuits (or similar heat generating components) *into* the display medium. Furthermore, given the relatively limited amounts of heat generated in a typical reflective electro-optic display, there is no reason why a skilled person would be led to believe that it was necessary to provide an air gap to assist removal of heat from the heat generating components.

Finally, in Paragraph 6 of the final Office Action, the Examiner rejects applicants arguments regarding the different function of the air gap in the Sato invention as compared to the present invention, with the statements that:

> The Applicants are advised that none of the functions of the air gap are currently claimed as limitations in the claims. Furthermore, these arguments seem address the intended use of the air gap. It is well settled that the intended uses of an apparatus have no significance in determining patentability of apparatus claims. *Ex parte Thibault*, 164 USPQ 666 (Bd. Pat. App. 1969).

With respect, the reference to "the intended use of the air gap" and the reference to *Ex parte Thibault* are manifestly inappropriate in the present situation. As stated in MPEP 2115, this case teaches that "Expressions relating the apparatus to contents thereof during intended use are of no significance in determining patentability of the apparatus claim." Applicants do not quarrel with this general proposition but deny that it has any application to the present claims. The present claims make no reference to any "intended use" of the apparatus. Applicants point out that the function of the air gap in the present apparatus, namely preventing flow of heat from the heat generating component to the electro-optic layer, is quite different from that in Sato, where the air gap serves simply as an optional channel for cooling gas flowing over the heat-generating display. Such a difference in the function of a particular integer (the air gap) within a combination (the display) due to differences between other integers of the combination (i.e., the type of display used) is a proper subject for discussion regarding the patentability of the

combination, and has nothing to do with the "intended use" of the entire combination. Hence, the reference to *Ex parte Thibault* in the final Office Action is entirely inapposite.

For all of the foregoing reasons, the rejections of the claims on appeal should be reversed and the application allowed.

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CLAIMS APPENDIX

Claims on Appeal

[Since claim 11 is the only independent claim remaining in the application, this claim is presented first for convenience.]

11. An electro-optic display comprising:

a layer of reflective electro-optic material capable of changing its optical state on application of an electric field thereto;

an electrode arranged to apply an electric field to the layer of electro-optic material;

a heat generating component in heat conducting relationship with the layer of electro-optic material, the heat generating component being disposed on the opposed side of the electrode from the layer of electro-optic material; and

a layer of thermally conducting material disposed between the heat generating component and the electrode, and an air gap present between the electrode and the layer of thermally conducting material, the layer of thermally conducting material and the air gap extending across the whole area of the layer of electro-optic material.

2. An electro-optic display according to claim 11 wherein the layer of thermally conducting material forms part of a printed circuit board having a conductive layer therein.

3. An electro-optic display according to claim 11 wherein the layer of thermally conducting material forms part of a plurality of layers of thermally insulating material and a plurality of layers of thermally conducting material, the layers of thermally insulating material alternating with the layers of thermally conducting material, and one layer of thermally conducting material being disposed between the layers of thermally insulating material and the layer of electro-optic material.

5. An electro-optic display according to claim 11 wherein the layer of thermally conducting material forms part of a polymeric film having a metal layer formed thereon.

6. An electro-optic display according to claim 5 wherein the layer of thermally conducting material forms part of an aluminized film.

22. An electro-optic display according to claim 11 wherein the electro-optic material comprises a rotating bichromal member material or an electrochromic material.

23. An electro-optic display according to claim 11 wherein the electro-optic material comprises an electrophoretic material.

24. An electro-optic display according to claim 23 wherein the electrophoretic material comprises at least one capsule having a capsule wall encapsulating a suspending fluid and a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the electrophoretic material.

25. An electro-optic display according to claim 23 wherein the electrophoretic material comprises a substrate having a plurality of closed cells formed therein, each of the cells having therein a suspending fluid and a plurality of electrically charged particles suspended in the suspending fluid and capable of moving therethrough on application of an electric field to the electrophoretic material.

EVIDENCE APPENDIX

[None]

RELATED PROCEEDINGS APPENDIX

[None]